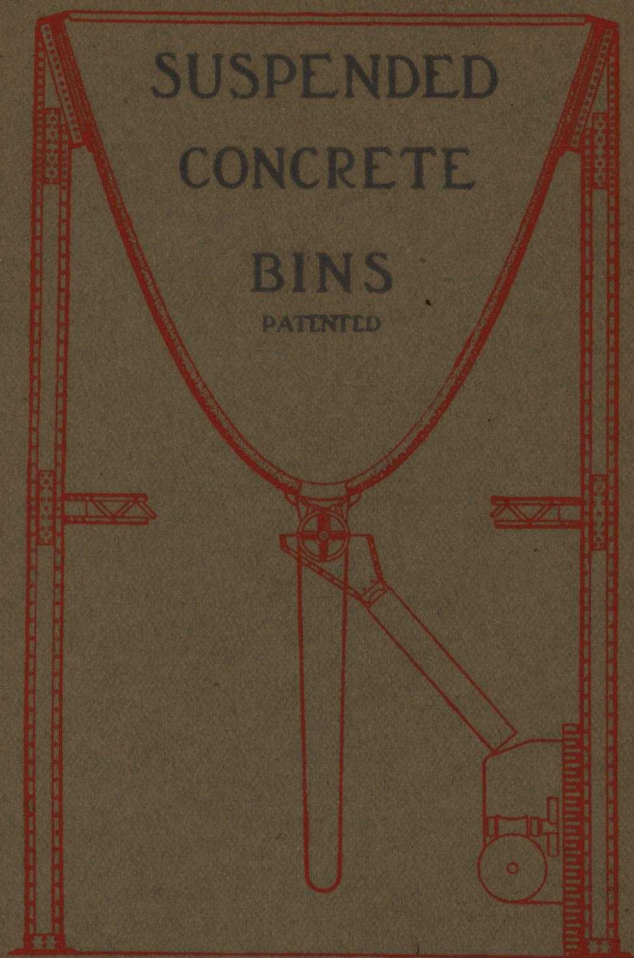


21, 183

BROWNHOIST

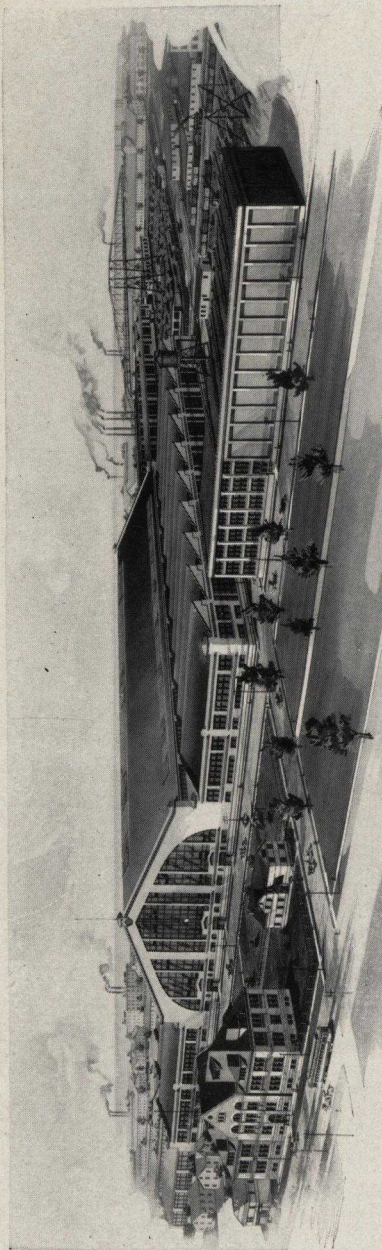
SUSPENDED
CONCRETE

BINS
PATENTED



CATALOG S 1914

The BROWN HOISTING MACHINERY CO.
CLEVELAND, OHIO
U.S.A.



Main Office and Works of Brownhoist Equipment

4403 St. Clair Ave. Cleveland, Ohio

BROWNHOIST

Suspended Concrete Bins

(Patented)

Catalog S 1914

The Brown Hoisting Machinery Company

Founded in 1880

Main Office and Works Cleveland, Ohio

BRANCH OFFICES

NEW YORK
50 Church Street

PITTSBURGH
Oliver Building

CHICAGO
208 S. La Salle St.

SAN FRANCISCO
Monadnock Bldg.

FORTLAND, ORE., The Colby Engineering Company



Brownhoist Suspended Concrete Coal Bin in the power plant of The Winnipeg Electric Railway Company, Winnipeg, Canada. The flow of coal is operated from the floor by hand chains.

Handling Coal and Ashes in Power Plants

Every power plant presents the problem of providing sufficient storage space for coal and ashes and an economical method of handling the same. This has always been one of the important and difficult problems with which the engineers have had to contend in power house design; principally on account of the corrosive action of the coal and ashes on steel.

Today practically every boiler is being installed with an automatic stoker. And an overhead bin is being used for storing the coal, from which the coal flows directly into the stokers. It is a well known fact that steel bins for coal and ashes are one of the most expensive installations used in connection with the power plant. This is due to the high cost of maintenance incurred by trying to resist the destructive action of the acid from the coal and ashes on the steel.

Consequently, it has been the aim of engineers to build these bins of a material that would resist effectively the destructive action of the acids, and at the same time give an efficient and economical installation together with a minimum cost of maintenance.

The Brownhoist Patent Suspended Bin is used for storing coal, coke, ashes, cement, sand and other materials. It is a concrete bin, with our Ferreinclave (page 7) as the reinforcement and is especially desirable for storing materials that corrode or deteriorate the ordinary steel-plate bin linings.

Occasionally the coal within a bin becomes ignited from spontaneous combustion. The Brownhoist Suspended Bin is so designed that all the steel is protected by concrete which prevents any damage being done by fire.

In designing this bin, we have paid particular attention to securing a form of a bin that would give a maximum storage in a minimum space and at the same time practically clean itself. But the main advantage is in having all of the steel that would naturally come in contact with the storage material, protected by concrete.

On request, our engineers will submit designs and suggestions on installing the concrete bin with coal and ash handling machinery in any new or old plants.





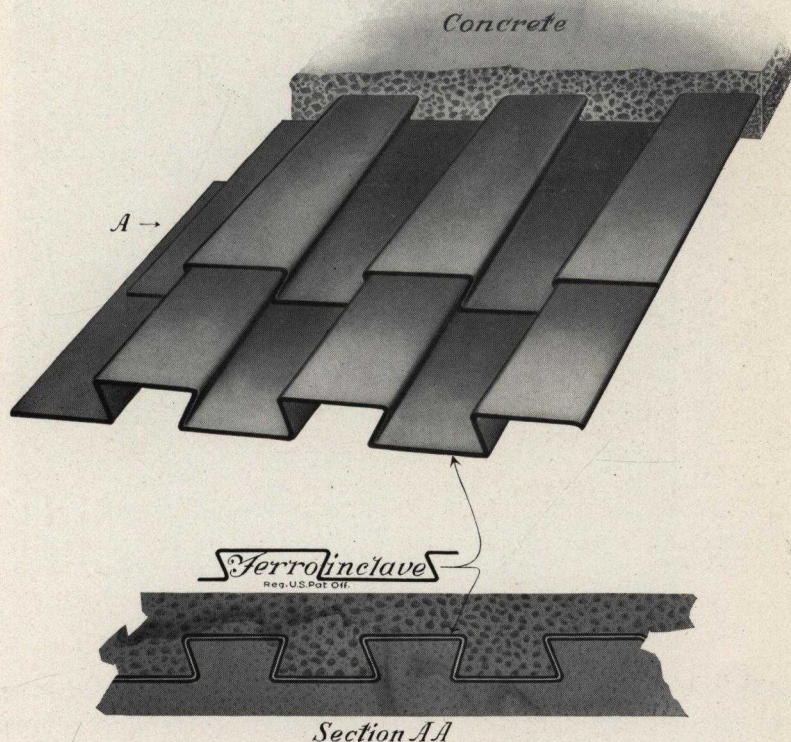
Ferroinclave Being Applied to the Framework of a Brownhoist Bin

Brownhoist Suspended Concrete Bin

The Brownhoist Suspended Bin consists of two horizontal steel-plate girders supported by upright columns, or hung from trusses, and from these girders the bin construction is suspended. The girders are inclined so as to make the the straps (described below) and the outside of the bin tangent to the girders. The illustration above shows this clearly.

At intervals of from 3 to 5 feet, steel straps which are parabolic in shape, are hung from these girders. To the inside of these straps, the Ferroinclave (page 7) is bolted and then the concrete is first applied to the inside of the bin and then to the outside. The steel straps are made strong enough to carry the weight of the reinforced concrete structure and the material to be stored in the bin.

In this bin all important members are in tension which is a great factor in reducing the size of the members (which means a lighter bin) and also in relieving the members from any excessive strains. In many cases the bin columns can be made to support the power-house roof and also any conveying machinery that might be used over the bins; in this case there is a material saving in steel due to shorter-span roof trusses.

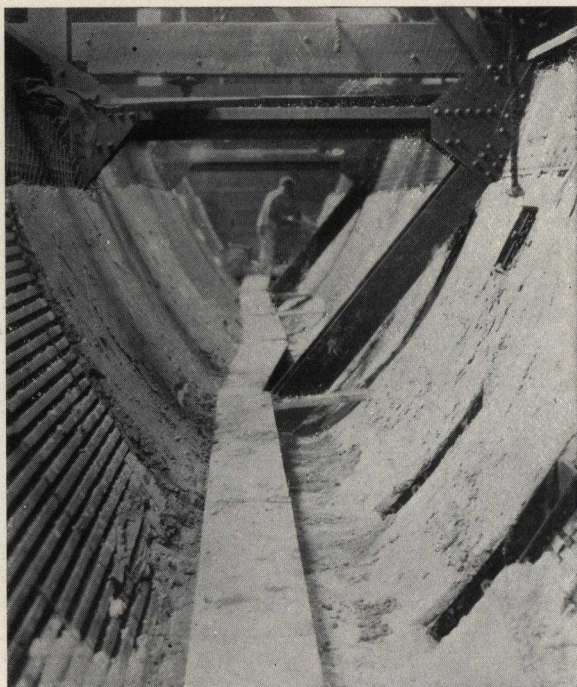


Ferroinclave Reinforcement for Concrete

Our patent covers the Suspended Bin with approximate parabolic shaped straps and with any lining placed upon these straps. Our experience has been that a concrete bin reinforced with Ferroinclave is the most economical and durable construction.

Ferroinclave is a sheet steel with dovetail corrugations which are inversely tapered, thus permitting the large ends of the corrugations of one sheet to fit or "shingle" over and into the small ends of the corrugations of adjoining sheet, forming a tight joint without destroying the dovetail corrugations, and making practically one continuous sheet. Ferroinclave is also used as a reinforcement for concrete roofs, floors, sidewalls, partitions, stairs, highway bridges, culverts, tanks, silos, etc.

The dovetail corrugations form a key for the concrete, making it possible to apply concrete to both the outside and inside of a bin without the use of centering or forms of any kind. This gives a greater



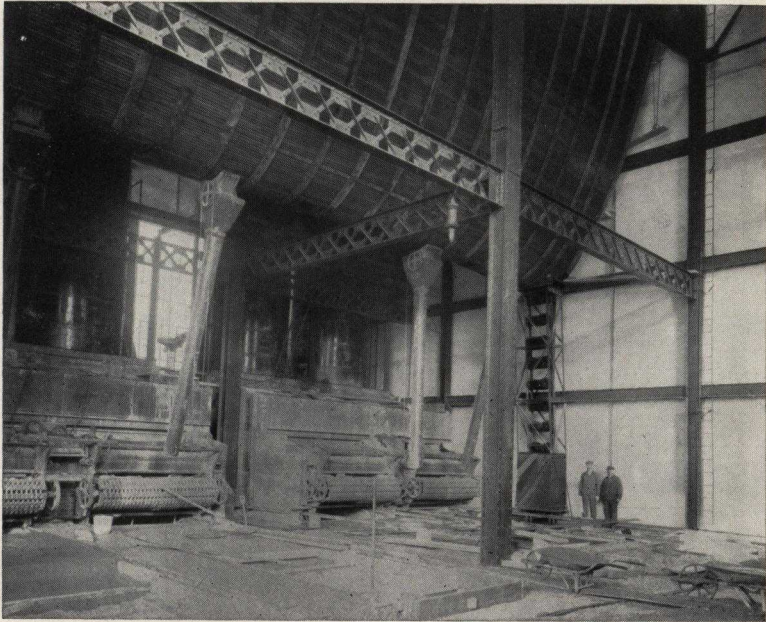
Applying Inner Lining of Concrete to Brownhoist Bin

speed in erection and also gives a smooth, white appearance to the outside of the bin. By using no forms or centering the cost of erection is reduced.

Concrete Lining

In lining a bin with a Ferroinclave reinforced concrete construction a wooden strip about $\frac{3}{8}$ inches thick by an inch wide is first placed on each curved strap. The Ferroinclave sheets are then placed on these strips and are secured to the straps with small bolts as shown on page 6. When the Ferroinclave is in place the upper part is coated with one part Portland cement to two and a half parts sand, or with a mixture of one part Portland cement, two parts sand and four parts broken stone, all stone to pass a $\frac{1}{2}$ inch mesh. The thickness of this lining varies with the span and loading. When this has set, the under side of the Ferroinclave is coated with a mixture of one part Portland cement, two parts sand with the addition of a small amount of goat hair. The mortar is pushed in between the straps and the Ferroinclave so as to solidly fill the $\frac{3}{8}$ in. space made by the wood strip.

Such a lining is strong, fire-resistive, moderate in cost, and cannot be corroded by the acid from the coal, ashes, etc., like a steel-plate lining.

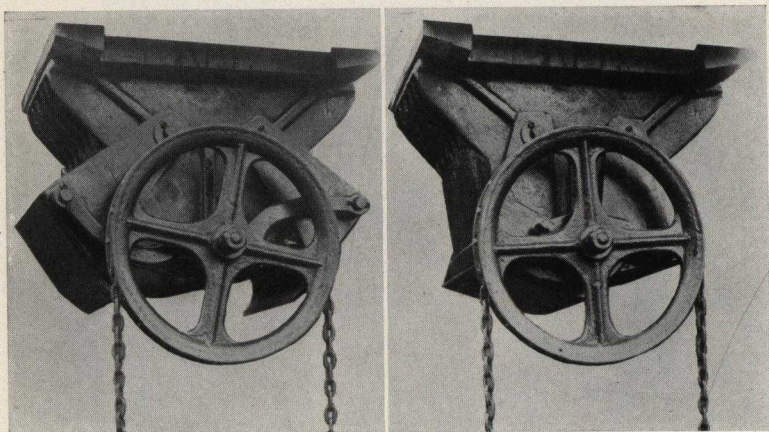


Brownhoist Bin before Concrete has been Applied to Outside

In furnishing the reinforcement for a bin we include enough open reinforcement to cover the girder and any other exposed parts. The reinforcement is secured to the girder by a special clip which we furnish. In this way, the girder is completely protected from the corrosive action of the material in the bin. In the Brownhoist Suspended Concrete Bin no steel is left exposed to the corrosive action of the acids in the coal or ashes.

Sometimes steel-plate linings are protected from corrosion by a coating of Portland cement mortar 1 to 2 inches thick secured to the plate by a wire netting or clips. A Ferroinclave lining erected complete costs less than the steel-plate coated with cement mortar. At the same time, it is fire resistive, neater in appearance, requires no painting, and should last practically forever.

The bin can be made so that all of the coal will flow out and no "dead" coal be left in between any two chutes. This is accomplished by placing a cinder concrete fill between the chutes, steep enough to cause all the coal to flow to the chutes.



Open

Closed

Brownhoist Chutes and Gates

The Suspended Bins are equipped with chutes, gates and spouts, through which the coal flows from the bin to the stokers. The chute is of cast-iron and is bolted to the bottom of the bin. The supply of coal to the stoker is regulated by means of the gate which is operated from the floor with pendent hand chains, or cords attached to a lever. The chute and chain-operated gate are shown above.

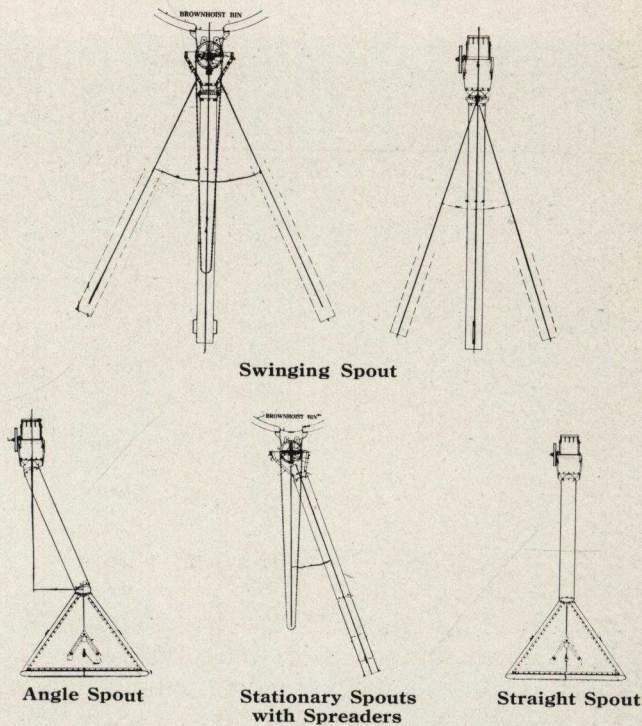
The gate consists of two steel-plate spades swinging from pins fastened to the chute. The operating mechanism is simple in design and is easily operated from the floor at all times. The spades are automatically locked when closed and when opened the full width.

The gates can be built to operate by air as shown on page 36. In this case they can be controlled from the floor or from larry running beneath the bin.

In case a hand operated larry is used in limited headroom, the bin is fitted with sliding gates as shown on page 16. This type of gate is operated from the floor by pendent hand chains.

For coal bins we have several different designs of chutes and gates which we will submit upon request.

For ash bins we furnish chutes, gates and spouts to meet requirements of the customer. We can make the ash chutes with a concrete lining which proves to be satisfactory as it protects the metal from the corrosive action of the acids in the ashes.



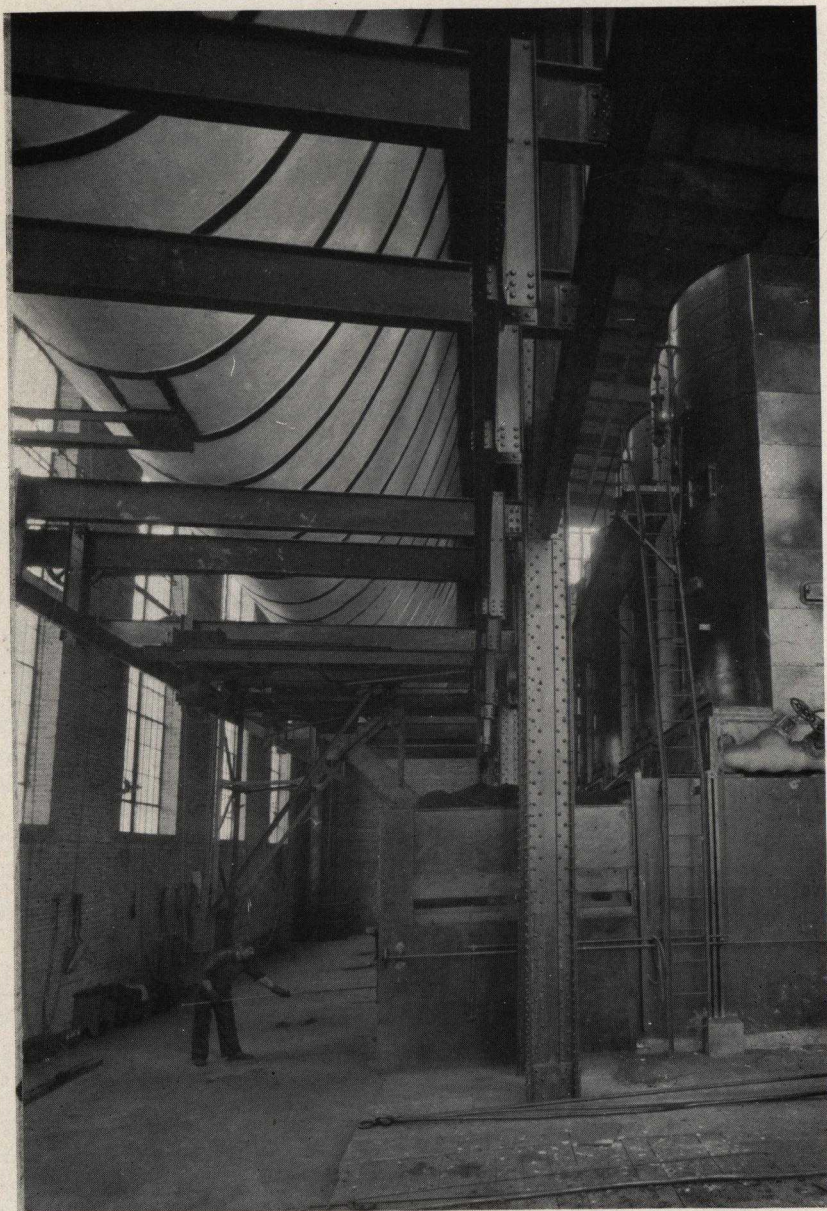
Brownhoist Spouts

We make several different designs of spouts, but the three shown here, the swinging spout, stationary spout, and stationary angle-spout are generally used. Any of these spouts can be attached to our chutes and gates described on opposite page. The spouts are of lap-welded wrought iron pipe which proves to resist the wear and action of the coal better than any other metal.

The swinging spout distributes the coal evenly to the hopper on the stoker by being swung back and forth by the attendant. The spout will serve two stokers which are stationed directly opposite each other. The frequency of operation of this spout depends upon the size of the stoker and the rate of feed.

The stationary spout is equipped with a steel-plate spreader at the lower end, which fits over the hopper on the stoker. It is provided with a baffle-plate which causes the coal to be distributed evenly to the stoker.

The stationary angle-spout is used when it is desired to deliver coal with the stationary spout to boilers located opposite each other, and thus avoid taking coal from the same chute.



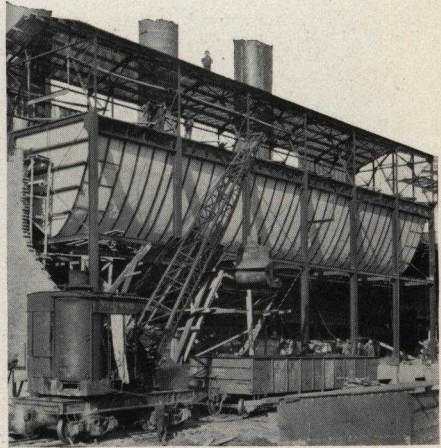
Brownhoist Suspended Concrete Bin in the power plant of the J. I. Case Threshing Machine Co., Racine, Wis. A Brownhoist weighing larry is used to deliver the coal from the bin to the stokers, giving the weight of all the coal used.

Capacities

Brownhoist Patent Suspended Bins are made in capacities ranging from 1 ton per lineal foot up to 15 tons per lineal foot. The capacities obtainable depend so much on the requirements of the customer that it is difficult to lay down a hard and fast rule.

Repairs

The bins require practically no repairs as the concrete lining is non-corrosive and fire-proof. The exposed parts such as gates, chutes and spouts can be easily removed without destroying the concrete lining in any way, and new ones applied.



Bin Completed before the Plant

Flexibility

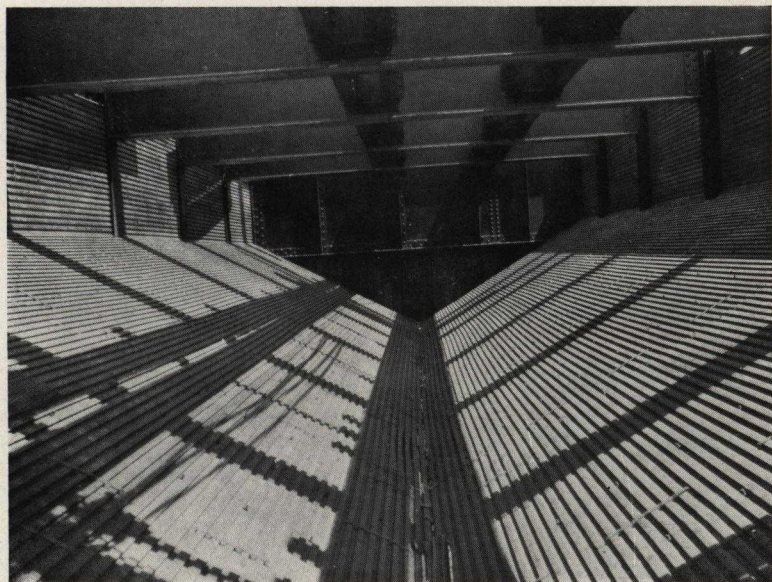
The Brownhoist Patent Suspended Bin can be used in any power plant. On account of its peculiar shape the bin can meet the customer's capacity requirements and still be placed in the boiler room without taking valuable space in front of the boilers. It is built to give the maximum storage in minimum space. The bin can be easily applied to any existing plant with practically no alterations. It can be lengthened at any time when more boilers are installed.

Efficiency

We claim a very low cost of repairs to all exposed parts and no repairs on the concrete lining whatever. The bin is practically self emptying, and the cost of operation is extremely low. If the coal handling machinery is properly designed we find the boiler rooms equipped with Brownhoist Patent Suspended Bins are remarkably clean. In many cases a concrete housing is carried up to the roof, thereby making an almost dustproof boiler room. The bin gives the boiler room a very neat appearance, as shown by the accompanying views of installations we have made.



Brownhoist Concrete Hopper-Type Bin used in the power plant of the
Cleveland Electric Illuminating Company.



Coal Bin with Semi-Hopper Bottom, Ferroinclave Lining,
Ready for Concreting.

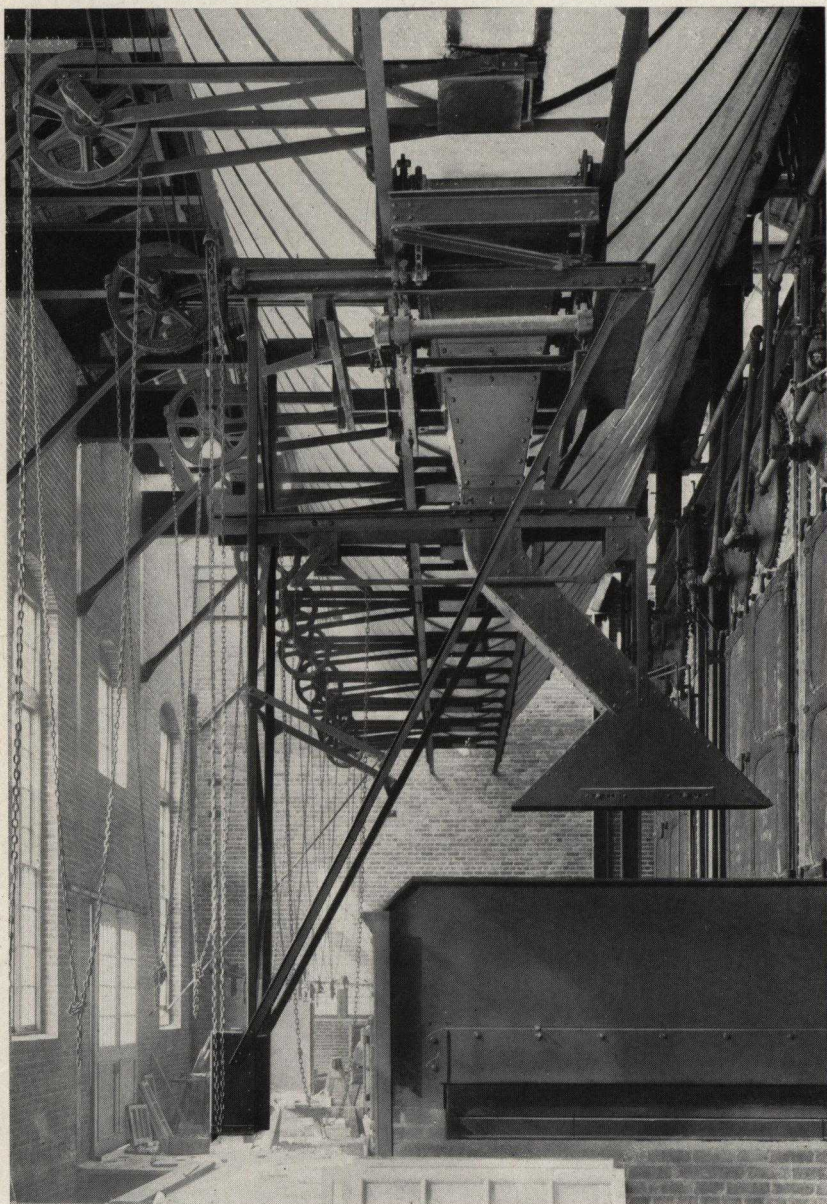
Other Types of Brownhoist Bins

Ferroinclave with the concrete linings is also used extensively for other types of coal and ash bins. It is found to be one of the best reinforcements for concrete hopper bins for storing various loose materials. With the hopper bins, we furnish all chutes, gates, and also weighing larries when wanted.

Ferroinclave can be used for bin structures of almost any shape. A neat appearance is obtained and the bin is economical and practically permanent.

On account of the great strength and light weight of Ferroinclave constructions there is a saving of materials; and because they can be erected easily and quickly without centering, there is a large saving in the time required to erect the bins. It also makes a fire-proof construction.

On receipt of request, we will submit designs and prices on the various types of concrete bins with Ferroinclave as the reinforcement.

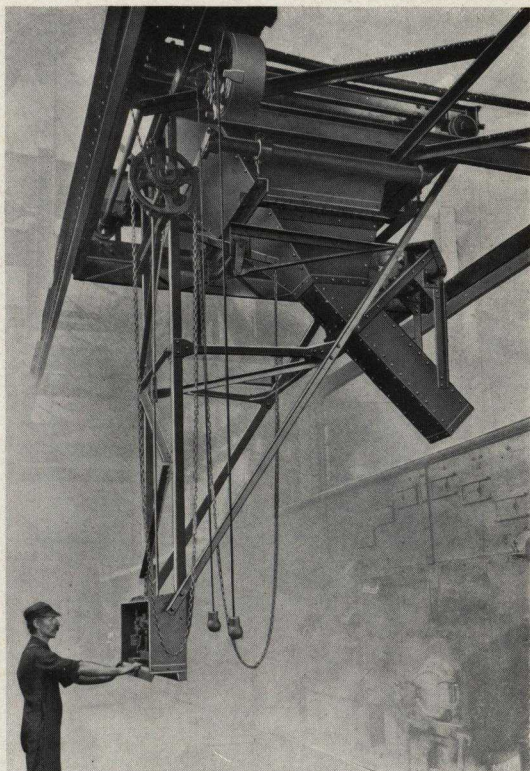


Brownhoist Suspended Coal Bin and Brownhoist Weighing Larry. The larry delivers the coal from the bin to the stokers, recording every pound.
Michigan Carbon Works, Detroit, Michigan.

Brownhoist Traveling Weighing Larry

The Brownhoist Weighing Larry is being installed in power plants in connection with the Brownhoist Suspended Concrete Bin. It is used for taking the coal from the bin, weighing it and delivering it to the stokers. The use of a weighing larry makes it possible to have an accurate record of the amount of coal consumed in any given length of time.

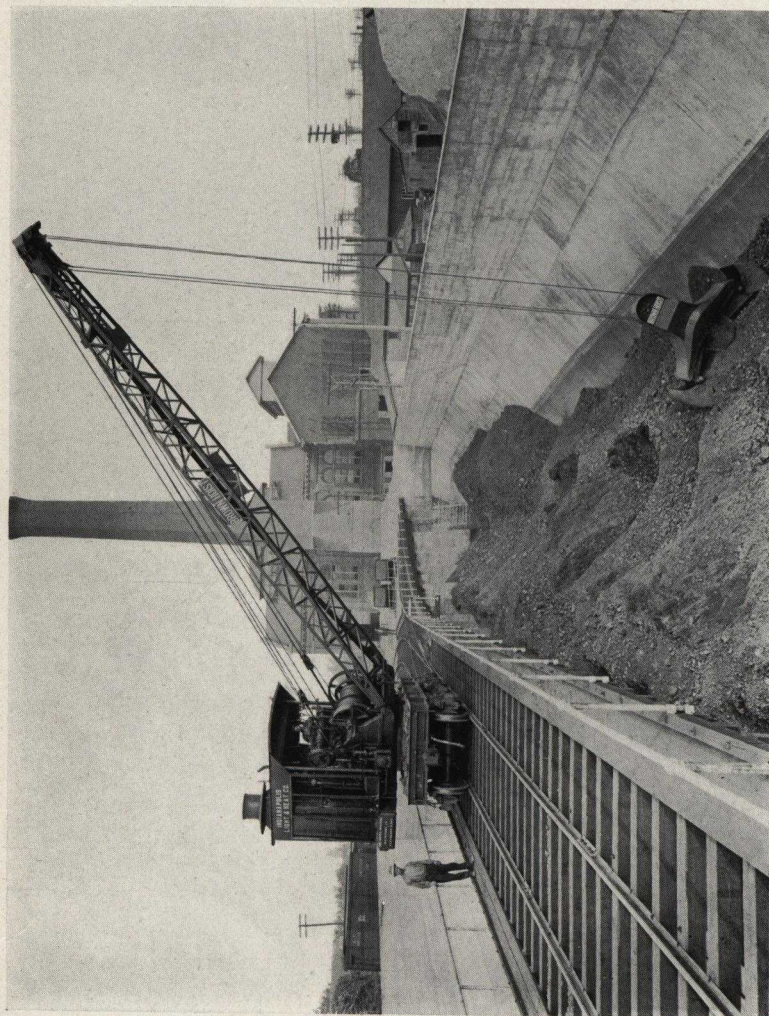
The coal is fed into the larry, and the weight is shown on the scales located close to the floor so that they can be seen, and then the coal can be dumped into the stokers. The weighing device is simple in construction and with the proper treatment will remain in good



Electric Larry

working condition for a long time. The larry can be equipped with automatic recording scales, or with a card registering device which requires the operator to insert a card and punch a lever when the beam is balanced, to have the weight registered on the card.

The larry travels on a suitable track located beneath the bin, taking the coal direct from the bin gates. It can be hand or electrically operated. The hand larry is operated by means of pendent hand chains. The electric larry is operated from the floor by pendent controller cords, or can be fitted with an operator's cab from which the operator controls the entire operation of the larry, and weighing of the coal.



15-Ton Brownhoist Locomotive Crane equipped with a 54 cu. ft. Brownhoist Coal Grab Bucket. This crane hoists the coal from the concrete storage pit and places it into cars to be carried into the power house.
Indianapolis Light & Heat Company, Indianapolis, Indiana.



Brownhoist Special Locomotive Crane with a Brownhoist Coal Grab Bucket handling coal on a trestle from and to the cars, stock pile and bin.
Murphy Power Co., Detroit, Michigan.

Brownhoist Coal and Ash Handling Machines

There are several types of coal and ash handling machines, some of which are shown in this catalog. The daily coal consumption, method of receiving coal, lay of the property and whether outside coal storage is wanted, all determine the type of machine to install. The Brownhoist machines include locomotive cranes, traveling bridge cranes, overhead traveling cranes, man trolleys, grab buckets and tubs.

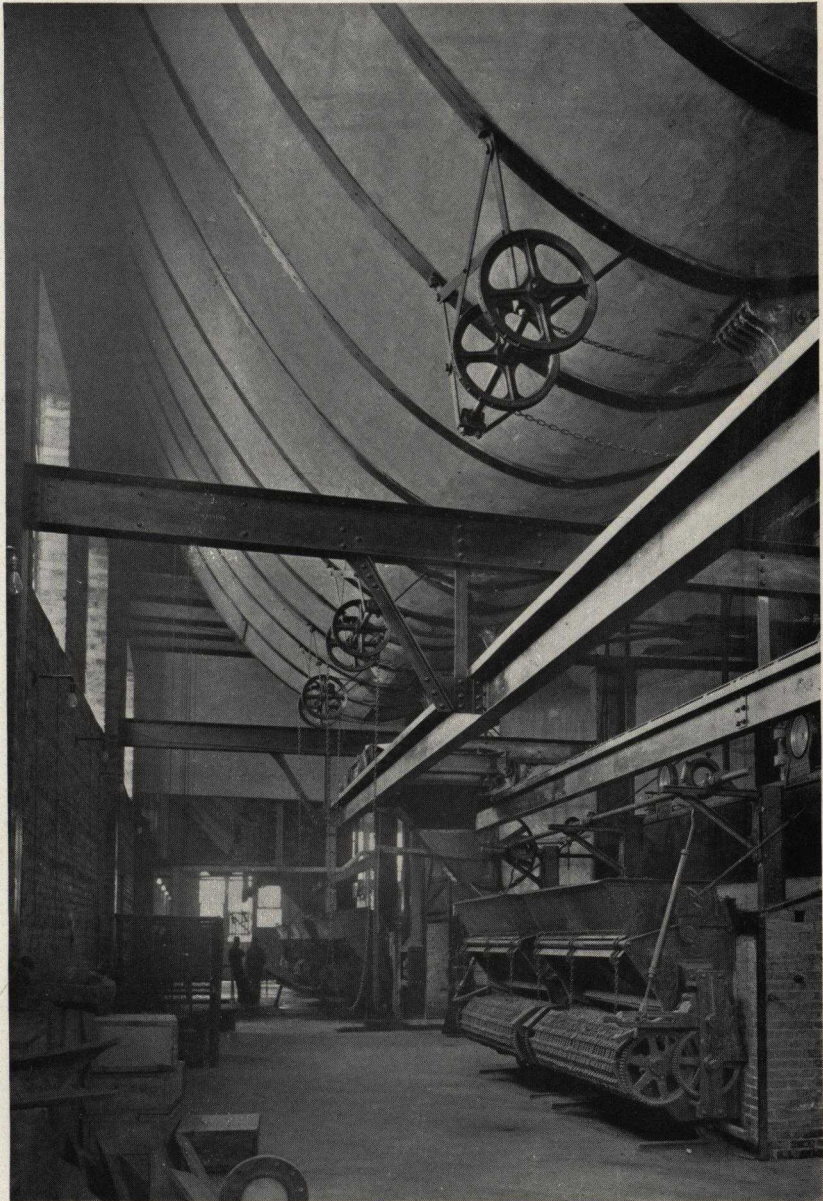
On receipt of request we will send catalogs on these different types of machines.

It is very important that well-built machines be used, as breakdowns which will occur with poorly constructed machines, will often cause a serious tie-up of the plant. All Brownhoist machines are built for hard and continuous service.

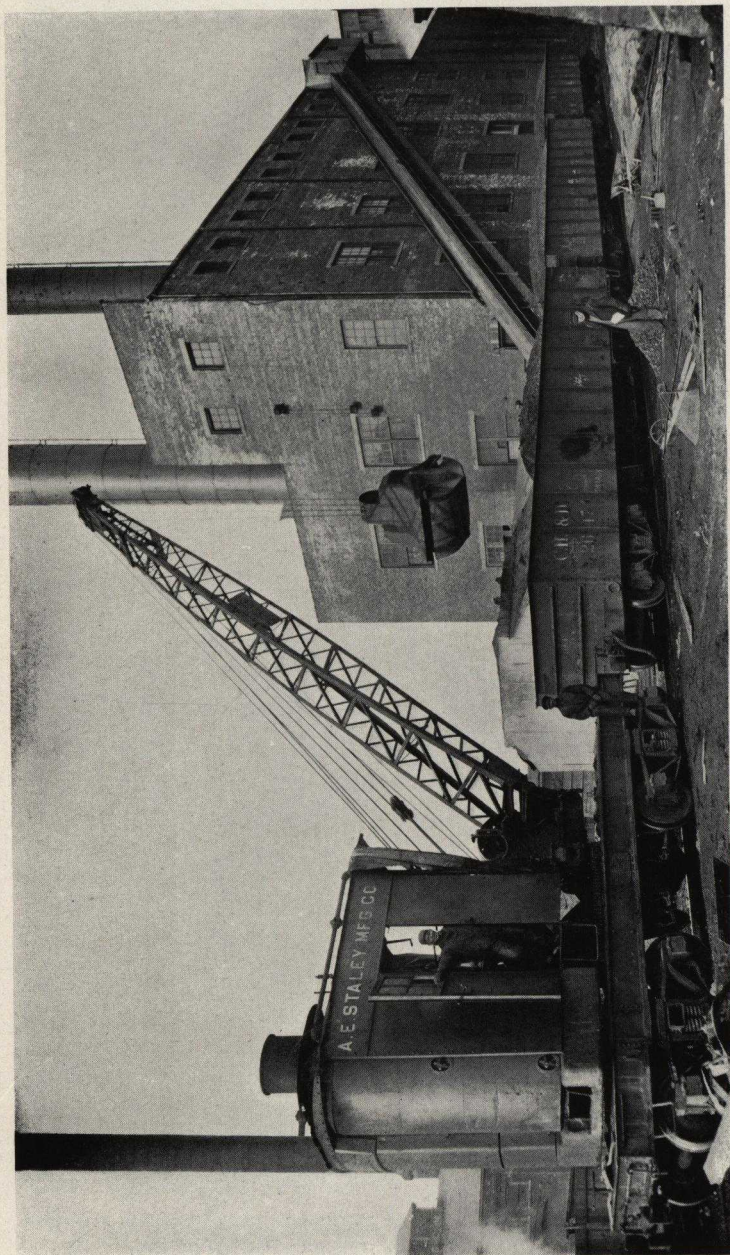
Our experience in power house designing and our thirty-four years crane experience enable us to give valuable suggestions to prospective builders of new plants. We will submit plans and prices on receipt of inquiries giving us the information asked for on page 38.



15-Ton Brownhoist Locomotive Crane and 54 cu. ft. Brownhoist Coal Grab Bucket used for filling coal bins (on opposite page) through hatches in the roof at the power plant of the Michigan Power Co., Lansing, Mich.



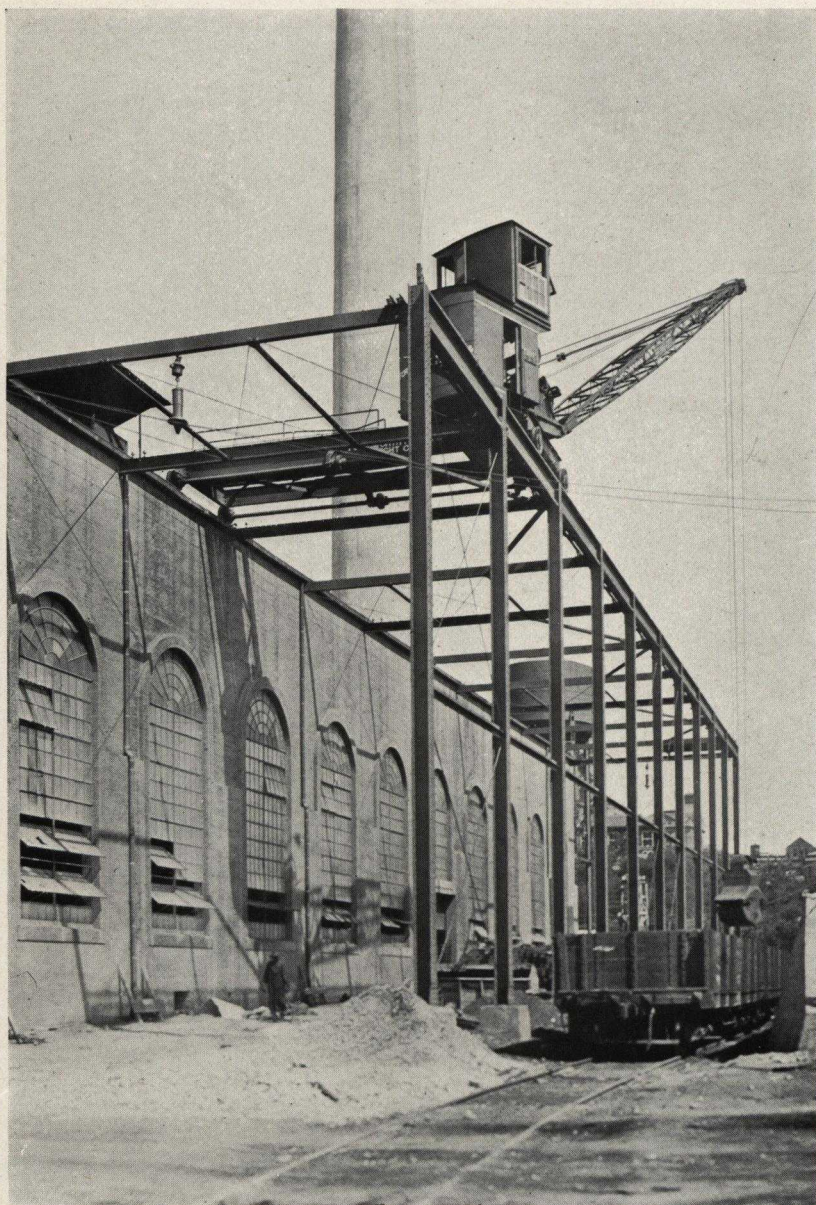
Brownhoist Suspended Concrete Coal Bin used in the power plant of the Michigan Power Co., Lansing, Mich. The coal is delivered to the bin by the Brownhoist Locomotive Crane as shown on opposite page. The coal is delivered from the bin to the stokers by a weighing larry.



Brownhoist 15-Ton Locomotive Crane with Brownhoist Coal Grab Bucket used by A. E. Staley Mfg. Co., Decatur, Ill., for unloading coal from cars to storage or to conveyor which carries the coal up to the concrete bin in the power house as shown on opposite page. The crane is also used for handling various materials around the plant.



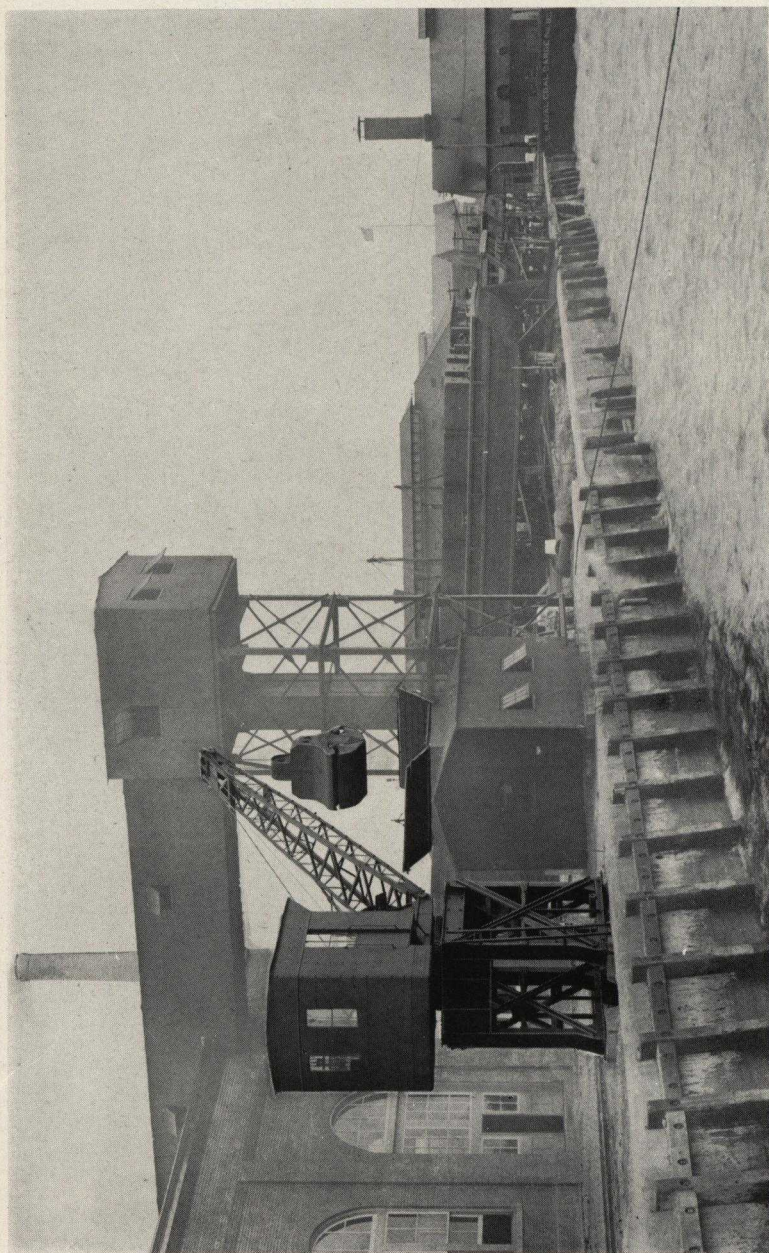
Brownhoist Suspended Concrete Bin in the power house of A. E. Staley Mfg. Co., as shown on opposite page. The bin is fitted with sliding gates through which the coal flows into stationary weighing hoppers before being fed into the stokers.



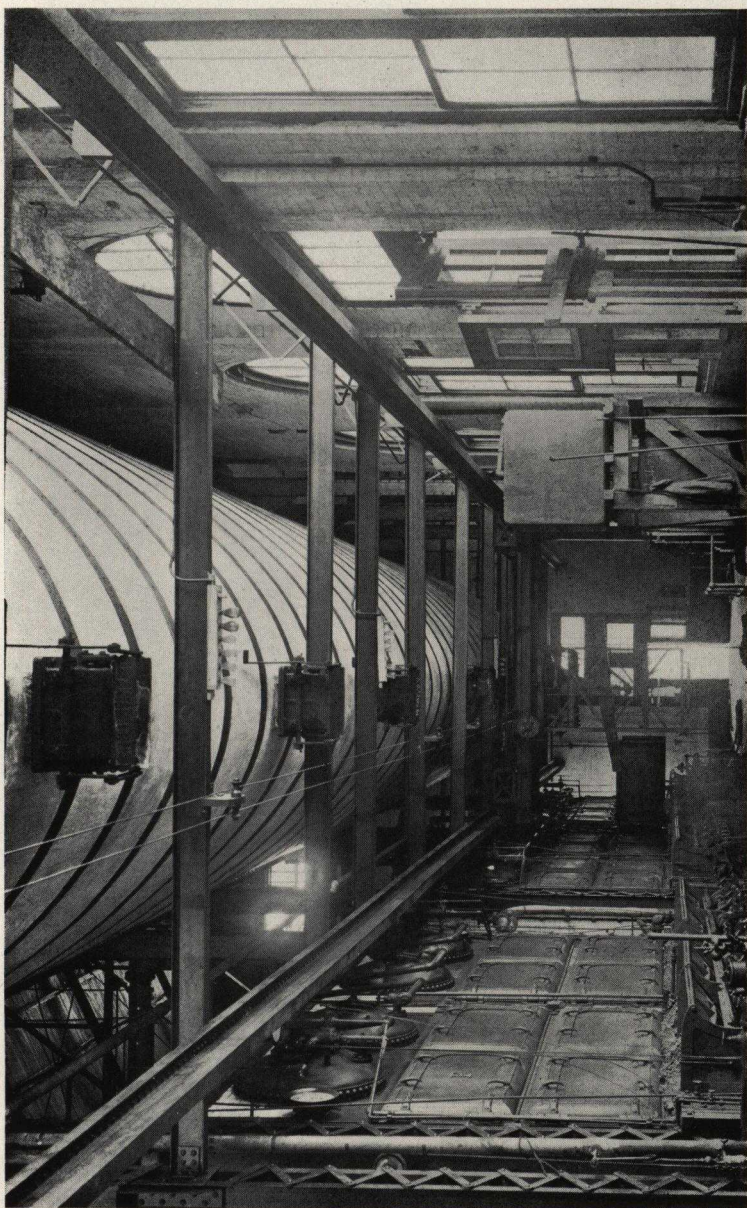
Brownhoist Special Locomotive Crane with Brownhoist Coal Grab Bucket used by the Ft. Worth Light, Heat & Power Co., Ft. Worth, Texas, for unloading coal from cars and placing it through hatches in the roof into the concrete bin, shown on opposite page.



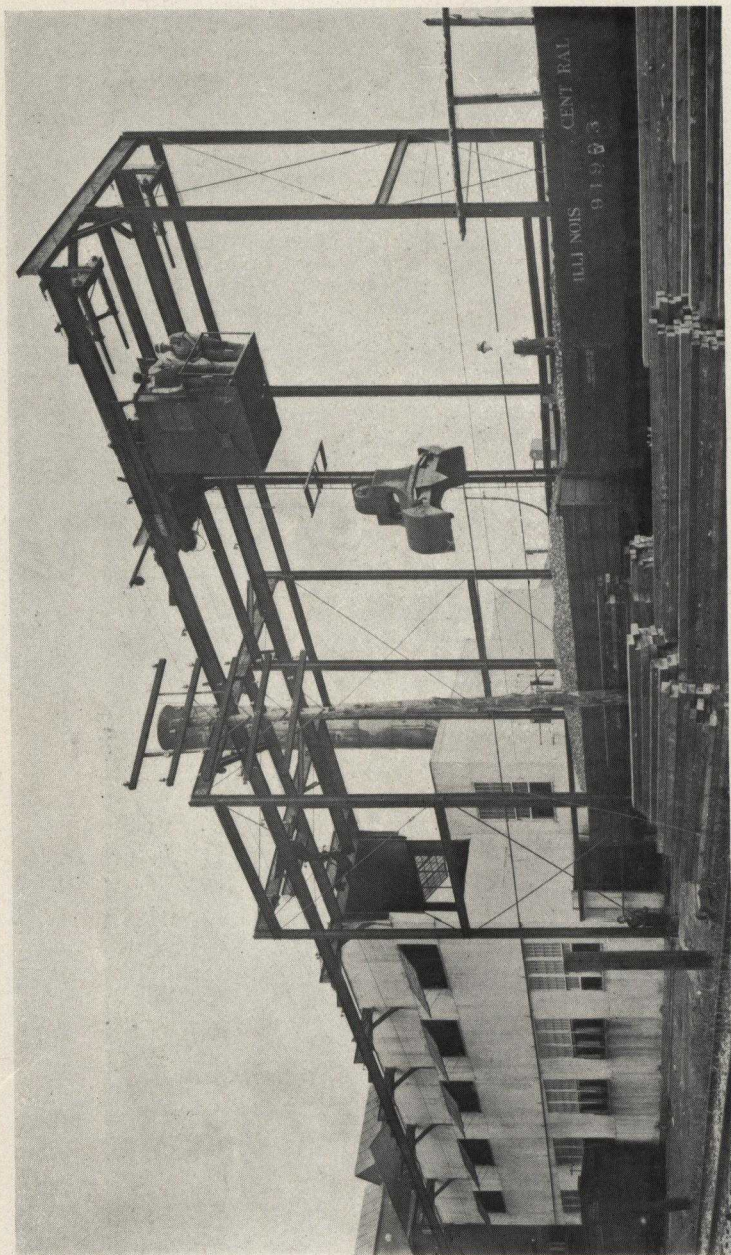
Brownhoist Suspended Concrete Bin in the power house of the Ft. Worth Light, Heat & Power Co., as shown on opposite page. Another row of boilers has been placed opposite to those shown here and both rows are fed by this bin.



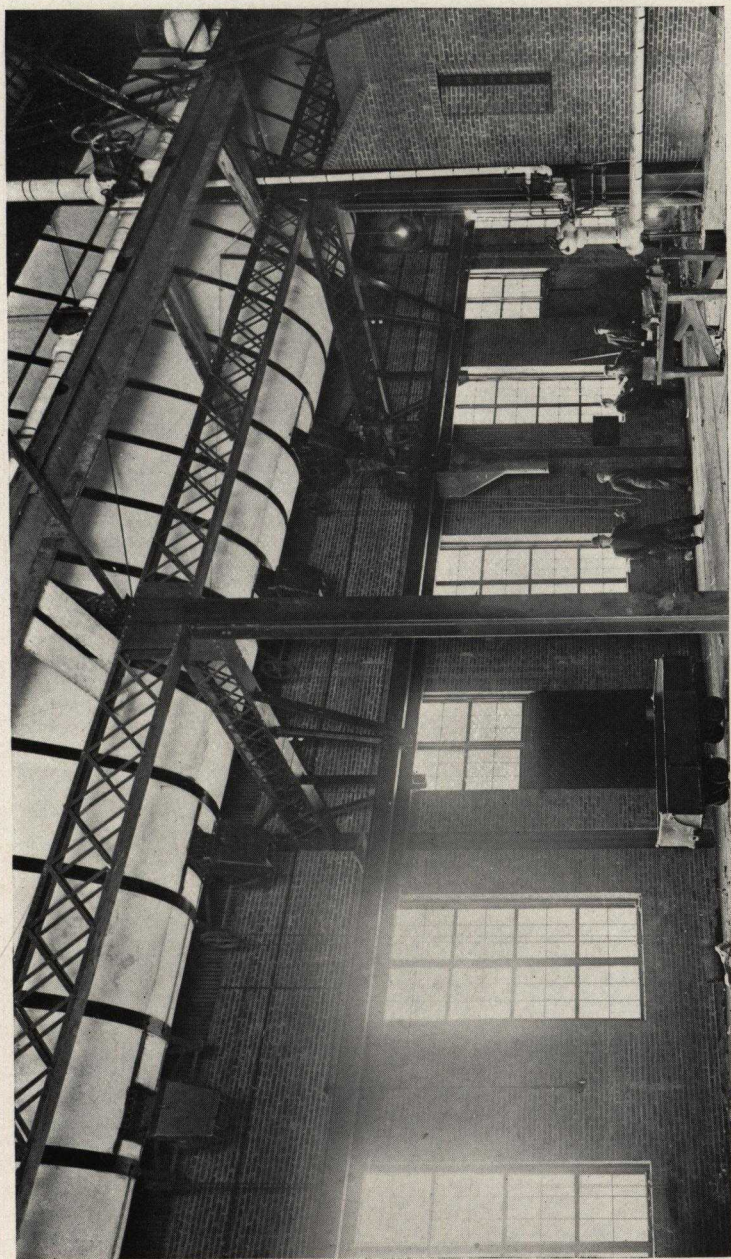
10-Ton Brownhoist Electric Locomotive Crane Superstructure mounted on a raised fixed pier and used for unloading coal from barges for power house use at United States Navy Yard, League Island, Philadelphia, Pa. The coal is delivered to a conveyor which carries it to the bin in the inside as shown on opposite page.



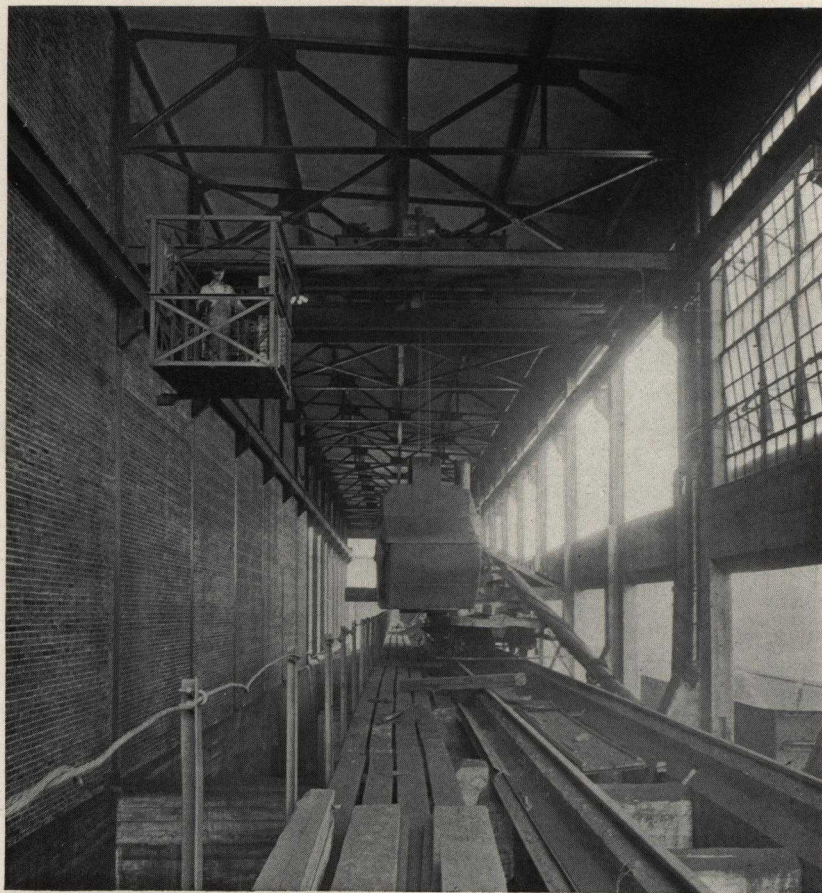
Brownhoist Concrete Bin in the power plant at the United States Navy Yard, League Island, Philadelphia, Pa., erected by The Guarantee Construction Co., of New York City. The coal is taken from the bin, weighed and delivered to the stokers by an electric traveling weighing larry. The coal is delivered to the bin from coal barges by a Brownhoist Locomotive Crane and conveyor (page 26.)



Brownhoist Monorail Man-Trolley equipped with a 27 cu. ft. Brownhoist Patented Grab Bucket in use at the power plant of the R. E. Wathen Co., Louisville, Ky. The trolley unloads the coal from cars and carries it to the boilers. The trolley also hoists the ashes from the ash-pit within the boiler house and carries them out to the cars.



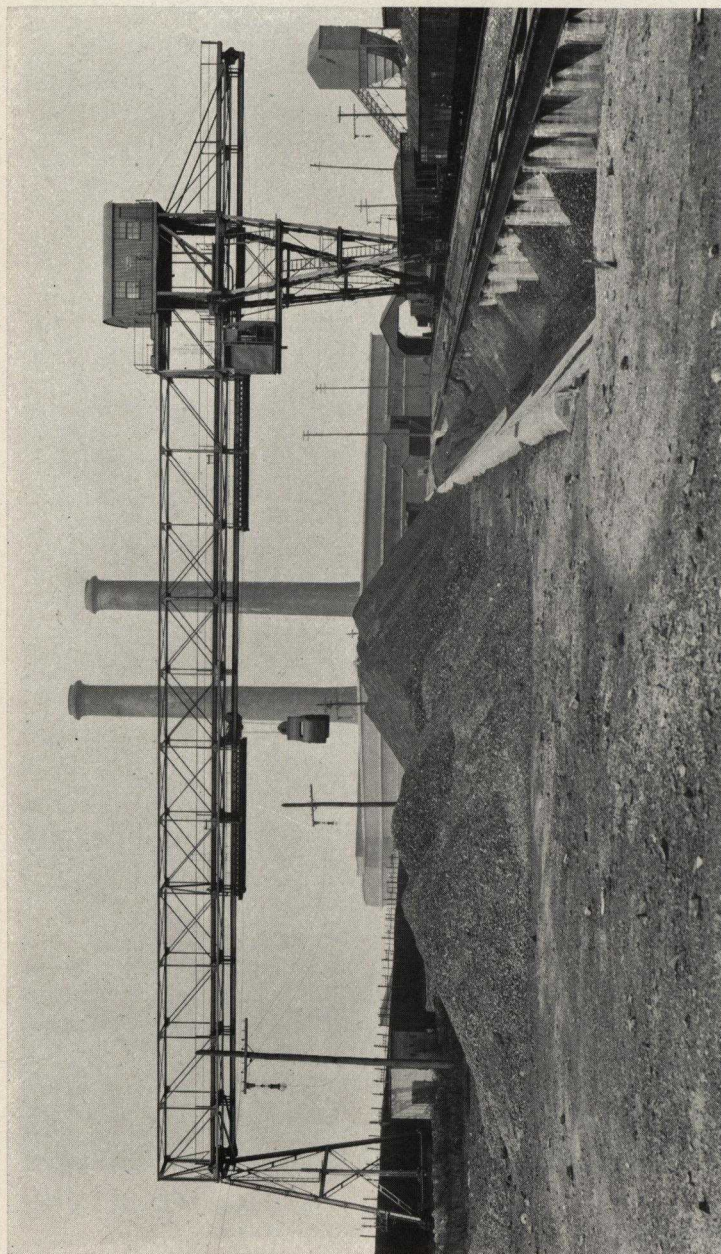
Brownhoist Suspended Concrete Bin in the power plant of the Consolidated Gas Electric Light & Power Co., Baltimore, Md.



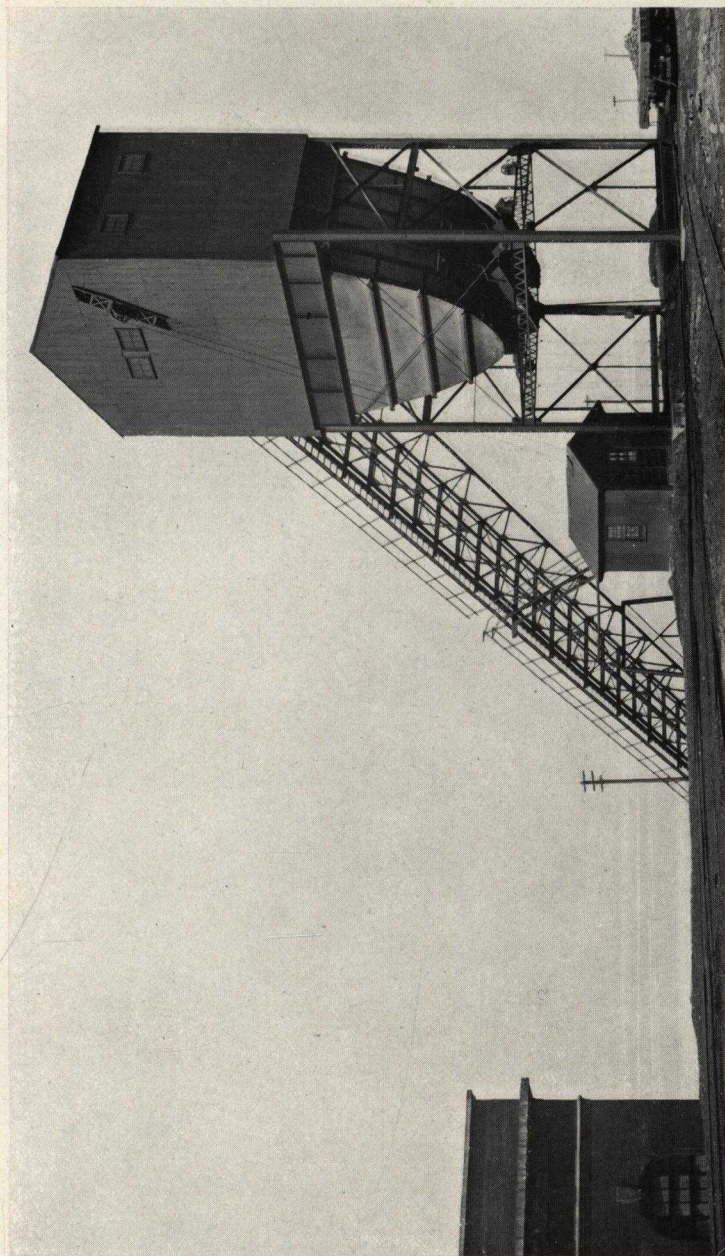
Brownhoist Overhead Traveling Crane with Brownhoist Coal Grab Bucket used at the power plant of the Memphis Street Railway Co., Memphis, Tenn. The coal is delivered to the plant in railroad cars and dumped into the storage pit shown above. The crane takes the coal from this pit and delivers it to a skip hoist which carries it to the Brownhoist Concrete Coal Bin as shown on the opposite page. This crane and bucket also hoist the ashes from ash pit and place them into cars.



Brownhoist Suspended Concrete Coal Bin in the power plant of the Memphis Street Railway Co., Memphis, Tenn. The coal is delivered to the bin from storage pit by the Brownhoist crane (shown on opposite page) and skip hoist.



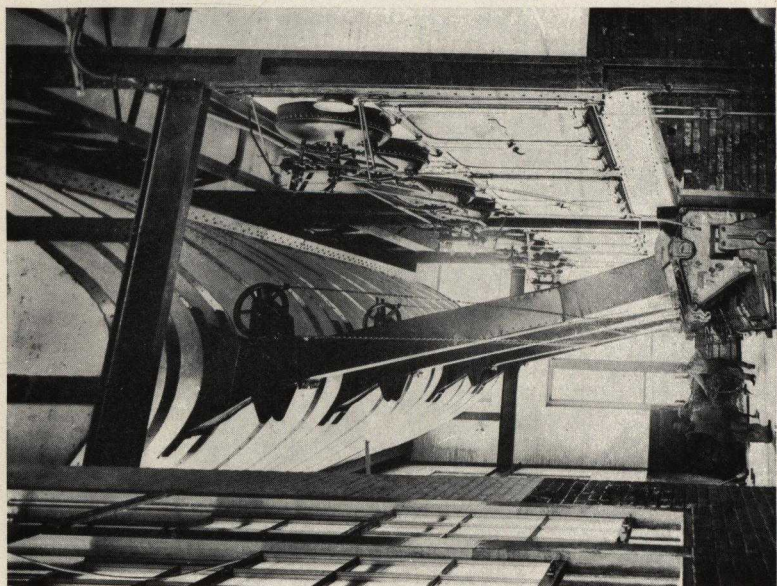
Brownhoist Electric Bridge Tramway used by The Cleveland Electric Illuminating Co., for unloading coal from cars to storage and vice versa. The coal is delivered to a conveyor in cars which carries it to the Brownhoist Concrete Hopper-Type Bins as shown on page 14. The Bridge is equipped with a Brownhoist 2-ton Coal Grab Bucket which travels on a trolley the entire length of the bridge. The bridge travels up and down the storage yard on foundation rails. It is operated by one man located in the operator's house.



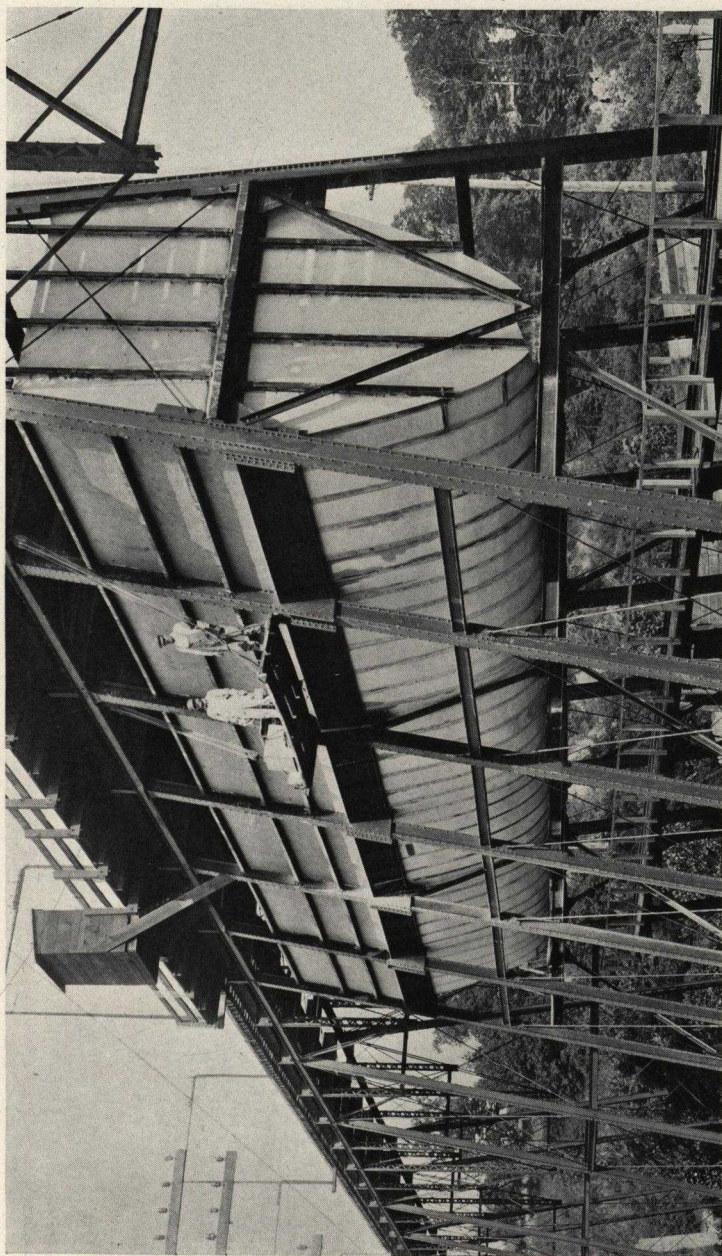
Brownhoist Suspended Concrete Ash Bin at the plant of The Cleveland Electric Illuminating Co. The ashes are carried from the power house in skip cars up to the bin located on the higher ground. The ashes are loaded into railroad cars direct from the bin.



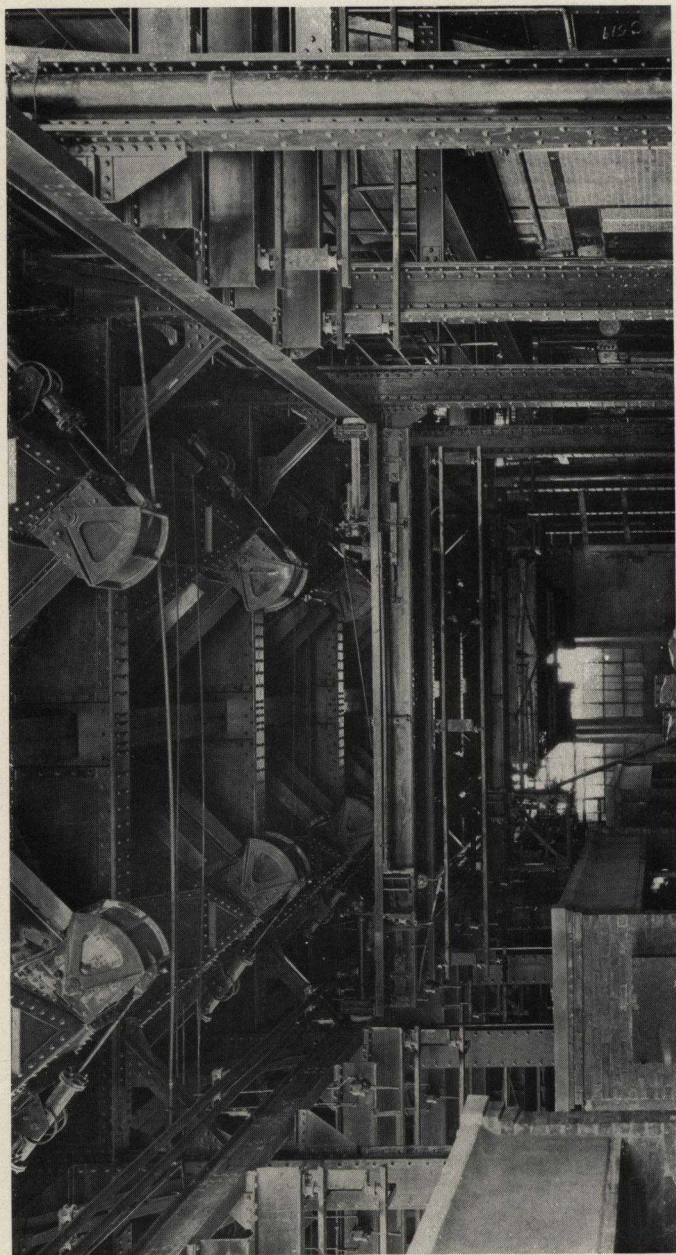
Brownhoist Concrete Coal Bin used in the power plant of the Worcester Salt Co., Silver Springs, New York. Erected by the Guarantee Construction Company, New York City.



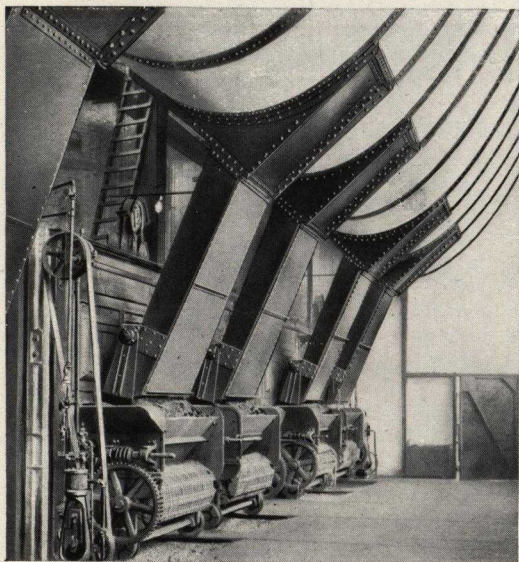
Brownhoist Concrete Coal Bin used by the St. Louis & San Francisco Railroad at Springfield, Mo.



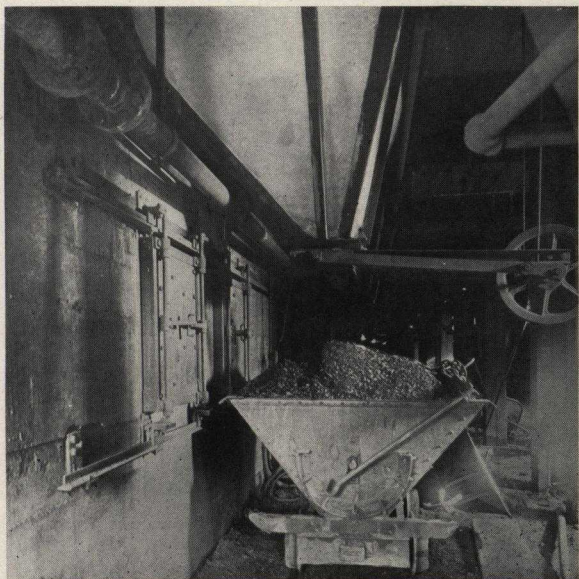
Brownhoist Concrete Coal Bin erected on a trestle at the power plant of The Cleveland, Painesville & Eastern R. R., Painesville, Ohio. The coal is dumped into the bin from cars on the track above and taken from the bin by industrial cars which carry it into the boiler house and dump it into the stokers.



Brownhoist Coal Larries and Transfer Cranes, and air operated Coal Gates as used in the Cleveland Municipal Electric Light Plant. The coal flows through the gates into hoppers on the larry, and the larry carries it to one of the two aisles on the right and delivers it to the stokers on both sides of the aisle. There is a cage provided on the larry in which the operator rides and controls the traveling of the larry and transfer crane, the opening and closing of the bin gates, the weighing of the coal, and the dumping of the coal into the stokers. There are two double rows of bin gates and one larry and transfer crane for each double row. There is an extra transfer crane provided for the larry on the left, to transfer the larry to the tracks in front of the boilers. The larries travel on I-beam tracks which are fitted with safety stops to prevent the larry from running off an open end.



Brownhoist Concrete Coal Bin erected in 1901 in our own power plant and is just as good today as when erected. There have been no repairs on the bin except on the spouts.



Brownhoist Concrete Hopper used for catching the fine coal falling through the grates in the power plant of the A. E. Staley Mfg. Co., as shown on pages 22 and 23.

Instructions for Sending Inquiries

We will quote on either

- a Bin erected complete.
 - b Material F. O. B. Cleveland ready for erection with Superintendent.
 - c Drawings and Royalty with Superintendent.
-

Inquiries on Brownhoist Suspended Concrete Bin should give

1. Plan and cross-section of boiler room with clearance dimensions accurately marked.
 2. Required capacity of bin.
 3. Kind of coal burned.
 4. Kind of stoker to be used and give dimensions of the same.
 5. What type of spout or if traveling weighing larry is desired. If weighing larry is wanted state whether hand or electric and if electric give current available. Whether automatic weighing card indexing system, or ordinary scale beam is wanted.
 6. Give number of boilers and gates, spacing of the same and number of spouts.
 7. Whether coal crusher is wanted and if so give capacity.
 8. State definitely what is to be included in quotation.
-

Inquiries on Brownhoist Coal Handling Machines should state

1. Amount of coal used per 24 hours.
2. How coal is received at the plant.
3. Whether outside coal storage is wanted and if so where can it be placed.
4. Location of power house in respect to railroad tracks or docks, and topography of the land adjoining the power house.

A. E. Staley Manufacturing Company

CORN PRODUCTS

Address Reply to
G. E. Chamberlain,
Superintendent

Decatur, Ill. Feb. 11, 1914.

Brown Hoisting Machinery Co.
Chicago, Ill.

Gentlemen:-

Since the purchase of the "Brownhoist" Locomotive Crane, and the installation of our coal and ash handling machine, and Ferroinclave coal bunkers, and additional boilers, we have doubled the capacity of our steam plant, increasing the efficiency by about 50%, and at the same time, have reduced the force required for operation from 35 men per day to 16 men, which amounts to a saving of about \$50.00 per day. If we were operating our present output on the old basis, the saving would be at least twice as great.

We have used the "Brownhoist" Crane for handling a great variety of material, and it has given satisfaction. We can easily unload screenings from cars at the rate of 100 tons per hour.

In conclusion would say, we appreciate very highly the treatment we have received at the hands of your Company. We believe you to be one of the few concerns who consider the moral obligations of a contract as obligatory, as though formally drafted in the written instrument.

We are pleased to take this means of expressing our high satisfaction at the work you have done for us, and our experience will certainly compel us in the future to take into consideration when placing contracts, the undoubted value of "Brownhoist Quality", which is something entirely tangible, though it cannot be covered in many cases by the most rigid specifications.

We beg to remain

Yours very truly,
G. E. Chamberlain
Superintendent.

GEC.ERD

See pages 22 and 23 for this installation.

The Brown Hoisting Machinery Company

Cleveland, Ohio

ENGINEERS AND MANUFACTURERS

OF

BROWNHOIST EQUIPMENT

Bridge tramways, fast plants, cantilever cranes, gantry cranes, locomotive cranes, overhead traveling cranes, work-car cranes, jib cranes, pillar cranes, bridge cranes, electric hoists, cableways, tramrail systems, trolleys, crabs, winches, buckets, tubs, furnace hoists, pig iron breakers, coal and ore dumping machines, storage bins, suspended bins, transfer tables, water closet shields, and Ferroinclave, a combined reinforcement and centering for concrete roofs, sides, stairs, bins, floors, etc.

Illustrated Catalogs and Pamphlets, as Follows, Sent on Application

Pamphlet C: Crabs and Winches
Catalog D: Tramrails, Trolleys and Electric Hoists
Catalog E: Tubs and Buckets
Pamphlet F: Locomotive Coaling Stations
Catalog H: Ferroinclave Fireproofing Construction
Pamphlet I: Locomotive Cranes
Pamphlet J: Pillar, Jib and Bridge Cranes, and Transfer Tables
Pamphlet K: Locomotive Grab Bucket Cranes
Pamphlet L: Locomotive Ore-handling Cranes
Pamphlet M: Sanitary Water Closet Shield
Pamphlet O: Coal- and Coke-handling Machinery for Gas Plants, etc.
Pamphlet P: Overhead Hand Traveling Cranes
Catalog Q: Modern Ore- and Coal-handling Machinery
Pamphlet R: Rapid Freight Handling Equipment
Pamphlet S: Suspended Bins
Pamphlet T: Drag-Line Excavators

Cable Addresses

"Brownhoist" Cleveland; "Brownhoist" New York; "Brownhoist" Chicago;
"Brownhoist" Pittsburgh; "Brownhoist" San Francisco

A B C, A 1, Engineering Telegraph, Lieber's, Atlantic Cable, Western Union
and New Business Codes used

Address all Communications to the Company at the Nearest Office

Brownhoist Suspended Concrete Bin

Brownhoist Patent Suspended Bins have been erected in all sections of the United States and in Canada. Anyone who desires to inspect this bin, may do so by writing us and stating in what localities it would be most convenient to make the inspection. We will give the addresses of firms nearest those places, who are using the Suspended Bin.

Following are some of the bins we have sold in the last few years:

U. S. Government,	{	Brooklyn Navy Yard
		Philadelphia Navy Yard
		Norfolk and Indian Head Navy Yard

McKeesport Tin Plate Co., McKeesport, Pa.
 U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
 St. Louis & San Francisco R. R., Springfield, Mo.
 Worcester Salt Co., Silver Springs, N. Y.
 Colonial Salt Co., Akron, Ohio
 Philadelphia Rubber Works Co., Akron, Ohio
 Laclede Gas Light Co., St. Louis, Mo.
 Grasselli Chemical Co., Cleveland, Ohio
 Grasselli Chemical Co., Grasselli, Ind.
 Cleveland Provision Co., Cleveland, Ohio
 Mutual Chemical Co., Jersey City, N. J.
 City of Baltimore, Baltimore, Md.
 Cleveland Electric Illuminating Co., Cleveland, Ohio
 American Fork & Hoe Co., Geneva, Ohio
 Winnipeg Electric Railway Co., Winnipeg, Canada
 Quincy Gas Electric & Heating Co., Quincy, Ill.
 Chicago, Lake Shore & South Bend Ry., Michigan City, Ind.
 Chicago, Rock Island & Pacific Ry., Chicago, Ill.
 Fort Worth Light & Power Co., Fort Worth, Texas
 Cleveland, Painesville & Eastern R. R., Painesville, Ohio
 American Agricultural Chemical Co., Detroit, Mich.
 Frederick & Hagerstown Power Co., Security, Md.
 Michigan Power Co., Lansing, Mich.
 Consolidated Gas, Electric Light & Power Co., Baltimore, Md.
 DeGrasse Paper Co., Canton, N. Y.
 Memphis Street Railway Co., Memphis, Tenn.
 General Chemical Co., Marcus Hook, Pa.
 Monongahela Valley Traction Co., Jayenne, W. Va.
 A. E. Staley Mfg. Co., Decatur, Ill.
 Salts Textile Mfg. Co., Bridgeport, Conn.
 Wayne Brewing Co., Erie, Pa.
 Havana Electric Ry. Co., Havana, Cuba
 Cleveland Railway Co., Cleveland, Ohio
 J. I. Case Threshing Machine Co., Racine, Wis.
 Hocking Valley Railway Co., East Toledo, Ohio
 Riverside & Dan River Cotton Mills, Danville, Va.
 Spring Valley Coal Co., Spring Valley, Ill.
 State Hospital for Insane, Rochester, Minn.
 Municipal Water & Light Plant, Lansing, Mich.
 Hewitt Rubber Co., Buffalo, N. Y.
 Casa Blanca Pumping Station, Havana, Cuba
 National Supply Co., Toledo, Ohio
 Atlantic Hygienic Ice Co., Brooklyn, N. Y.

